CLAIMS

1. A vehicle stability compensation system which is arranged to adjust dynamically the self-centering position and the steering feel of the steering system during split mu braking operation, the adjustment being based on at least one operational variable representing a corrective steer angle for the vehicle which is added to the main EAS assistance torque via a driver feedback controller whereby to maintain the vehicle stable and controllable.

2. A vehicle stability compensation system as claimed in claim 1, comprising a means for establishing braking yaw moment as said operational variable representative of a correcting steer angle.

3. A vehicle stability compensation system as claimed in claim 2, wherein the braking yaw moment is established by generating and subtracting from each other estimates of the brake pressures at the front left and front right wheels, multiplying the difference by a constant to give the difference in brake forces for the front wheels, and dividing the result by the track width of the vehicle.

4. A vehicle stability compensation system as claimed in claim 3, wherein the braking yaw moment is multiplied by a gain to give the corrective steer angle.

5. A vehicle stability compensation system as claimed in claim 1, comprising a means for establishing yaw oscillation moment as said operational variable representative of a corrective steer angle.

6. A vehicle stability compensation system as claimed in claim 5, wherein the yaw oscillation moment is established by inverting a yaw rate signal,

multiplying this by a gain and using the result as a feedback signal providing yaw oscillation correction.

7. A vehicle stability compensation system as claimed in claim 1 comprising means for establishing lateral drift correction as said operational variable representative of a corrective steer angle.

8. A vehicle stability compensation system as claimed in claim 7, wherein lateral drift correction is established by inverting a vehicle lateral acceleration signal and applying proportional plus integral compensation to provide the lateral drift correction.

9. A vehicle stability compensation system as claimed in any of claims 1 to 8, wherein the driver feedback controller takes one of said operational variables, or the sum of two or more of the variables, subtracts them from the actual steering angle, and adds the result to the EAS assistance torque.

10. A vehicle stability compensation system as claimed in claim 9, wherein said result is added to the EAS assistance torque by way of a gain and a limiter.

11. A vehicle stability compensation system as claimed in claim 10, wherein steering velocity feedback is arranged to be applied to prevent the shift resulting in under-damped steering oscillations.

12. A vehicle stability compensation system as claimed in claim 11, wherein the driver feedback is phased out at lower speeds to avoid impeding low speed driver manoeuvres.

13. A vehicle stability compensation system as claimed in claim 1, comprising a means for establishing yaw oscillation correction with an operational variable representative of a corrective steering velocity.

14. A vehicle stability compensation system as claimed in claim 13, wherein said operational variable of corrective steering velocity is subtracted from the actual steering velocity and the result is added to the EAS assistance torque.

15. A vehicle stability compensation system as claimed in claim 1 wherein said operational variable is vehicle yaw rate and wherein a vehicle model is used to generate an estimate of yaw rate from vehicle speed and steer angle.

16. A vehicle stability compensation system as claimed in claim 15, wherein said estimated yaw rate is subtracted from the actual vehicle yaw rate to give a yaw rate error.

17. A vehicle stability compensation system as claimed in claim 16 wherein said yaw rate error is passed through a compensator in order to estimate the yaw moment causing the yaw rate error.

18. A vehicle stability compensation system as claimed in claim 17 wherein the estimated yaw moment is used to modify the yaw behaviour of said vehicle model.

19. A vehicle stability compensation system as claimed in claim 2, wherein the braking yaw moment is generated by means of a vehicle model and compensator as claimed in claims 15 to 18.

20. A vehicle stability compensation system as claimed in any of claims 1

to 19, including a means for deriving a driver compliance rating corresponding to a driver's resistance to accept additional steering demands provided by the system.

21. A vehicle stability compensation system as claimed in claim 20, including means for establishing said driver compliance rating using a lookup map based on operational variable steering column torque.

22. A vehicle stability compensation system as claimed in claim 20, including means for establishing said driver compliance rating using a lookup map based on operational variable rate of change of driver steering torque.

23. A vehicle stability compensation system as claimed in claim 21 or 22, wherein a combination of driver compliance rating is established based on the steering column torque and rate of change or driver steering torque, for example by multiplication.

24. A vehicle stability compensation system as claimed in any of claims 2 to 8, wherein the steer angle error is established by subtracting demand steer angle from actual steer angle.

25. A vehicle stability compensation system as claimed in claims 20 and 24, including means for establishing the driver compliance rating using a lookup map based on the operational variable steer angle error.

26. A vehicle stability compensation system as claimed in claims 22 and 25, wherein a combination of driver compliance ratings is established based on the combined rating from claim 28 and the steer angle error of claim 25.

27. A vehicle stability compensation system having driver compliance

rating as claimed in claim 21 or 25, or combined compliance rating as claimed in claim 26, which is used to scale the EAS assistance torque as claimed in claim 9 for the purposes of preventing excessive torque application.

28. A vehicle stability compensation system as claimed in any of claims 1 to 27, including means for establishing a value representative of vehicle stability.

29. A vehicle stability compensation system as claimed in claim 28, wherein said vehicle stability value is established using a lookup map based on operational variable actual yaw rate.

30. A vehicle stability compensation system as claimed in claim 28, wherein said vehicle stability value is established using a lookup map based on operational variable yaw acceleration.

31. A vehicle stability compensation system as claimed in claim 29 and 30, wherein a combination of vehicle stability rating is established by combining said actual yaw rate and yaw acceleration, for example by multiplication.

32. A vehicle stability compensation system as claimed in claim 28, wherein said vehicle stability value is established using a lookup table based on operational variable steer angle.

33. A vehicle stability compensation system as claimed in claims 31 and 32, wherein a combination of vehicle stability ratings is established by multiplying together said ratings as obtained by the arrangements of claims 31 and 32.

34. A vehicle stability system as claimed in claim 26 and claim 33

wherein the driver compliance rating and vehicle stability rating are combined, for example by multiplication.

35. A vehicle stability compensation system as claimed in claim 1 having means for variation of ABS initial sympathetic pressure dump, the dump valve open time being based on the driver's compliance as generated in claim 26 or the vehicle stability rate as generated in claim 33, or on the combination of the two as claimed in claim 34.

36. A vehicle stability compensation system as claimed in claim 1 having means for variation of ABS front high mu pressure ramp, the apply valve time being based upon the driver compliance as generated in claim 26 or the vehicle stability rate as generated in claim 33, or on the combination of the two as claimed in claim 34.

37. A vehicle stability system as claimed in any of claims 1 to 36, having means for generating an estimated vertical load split from vehicle deceleration and vehicle parameters.

38. A vehicle stability compensation system as claimed in claim 37, including means for generating rear pressure demand by multiplying the measured front high mu brake pressure by an estimated vertical load ratio as claimed in claim 37.

39. A vehicle stability compensation system as claimed in claim 38, wherein the rear pressure demand is scaled by multiplication by driver's compliance as established in claim 26 or vehicle stability as established in claim

33, or a combination of the two as established in claim 34.

40. A vehicle stability compensation system as claimed in claim 38 or 39 in which then rear pressure demand is filtered to remove high pressure frequency components and rapid changes from demand pressure signal.

41. A vehicle stability compensation system as claimed in claim 40 including means for initialisation of the filter by an enabling split mu flag from the vehicle ABS whereby the initial value of the filter is set to the instantaneous value of the measured rear high mu brake pressure for removing any lag introduced by initialising the filter at a value of zero.

42. A vehicle stability compensation system as claimed in any of claims 38 to 41, having means for modification of the ABS to control the high mu rear pressure to demand pressure.